



**Dartmouth College**  
*Department of Economics*  
6106 Rockefeller Hall  
Hanover, New Hampshire 03755

TELEPHONE: (603) 646-2535  
FAX: (603) 646-2122  
E-MAIL: [jonathan.skinner@dartmouth.edu](mailto:jonathan.skinner@dartmouth.edu)

Jonathan S. Skinner  
*John Sloan Dickey Third Century Professor, Economics*  
*Professor, The Dartmouth Institute for Health Policy and Clinical Practice,*  
*Dartmouth Medical School*

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Richard Suzman, Ph.D.  
Associate Director, National Institute on Aging  
National Institutes of Health  
Gateway Building, 533  
7201 Wisconsin Avenue  
Bethesda, MD 2081

Dear Richard:

Following a visit by several economists to the NIA under the auspices of the American Economic Association Committee on Government Relations, you had asked for some thoughts on gaps in our knowledge of the economics of aging and health and suggestions for research topics with potentially high scientific yields. Dan Newlon, the executive director of our committee, reached out to more than 30 leading economists for their opinions on future and unmet research needs in this area. We received a robust response from these scholars. In our efforts to pare down their comments to something more manageable, I have acted for the Committee on Government Relations in a purely editorial role to pare back the combined suggestions, focusing less on the background research and motivation – which can be found in the 50-page appendix – and more on the specific recommendations for future research topics. These recommendations follow.

Please let us know if you require further information or if you would like to discuss these issues further.

Sincerely,

Jonathan Skinner

## **Ideas for Future Research in the Economics of Health and Aging**

### **Respondents/Authors:**

Katherine Baicker (Harvard University), Charles Brown (University of Michigan), John Bound (University of Michigan), Dora Costa (UCLA), Liran Einav (Stanford University), Amy Finkelstein (MIT), Alan Garber (Stanford/Harvard University), Dona Ginther (University of Kansas), Michael Grossman (CUNY), Jonathan Gruber (MIT), Alan Gustman (Dartmouth College), Michael Hurd (The Rand Corporation), Alan Krueger (Princeton University), David Laibson (Harvard University), Ron Lee (UC Berkeley), Helen Levy (University of Michigan), Dean Lillard (Cornell University), Nicole Maestas (The RAND Corporation), Jean Mitchell (Georgetown University), Vincent Mor (Brown University), Joseph Newhouse (Harvard University), Luigi Pistaferri (Stanford University), James Poterba (MIT and NBER), Ananth Seshadri (University of Wisconsin), Jody Sindelar (Yale University), Duncan Thomas (Duke University), Till von Wachter (Columbia University), Robert Willis (University of Michigan), David Wise (Harvard University), Gena Zamarro (The RAND Corporation).

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Each topic is considered below, listed in alphabetical order.

### **Behavioral Models of Health and Aging**

Opportunities lie in using behavioral economics to develop a better understanding of potential biases in 1) decision-making, 2) implementation of decisions, and 3) response to policies. For example, projects could use psychological, social, and financial incentives to improve health behaviors and possibly to encourage continued employment as well. Can habits be changed to promote preventive activities? Do individuals respond differently to policies based on levels of self-control, emotions at the point of decision, or genes?

Studies of decision-making should focus on factors *pertinent to older individuals* (e.g. cognitive decline) and also on *specific decisions that older individuals have to make*, e.g. adherence to treatment for multiple chronic conditions and anticipation of end-of-life. Too often college students are used as subjects and general decision-making is examined using hypothetical scenarios. Economic outcomes and health should be examined in parallel.

Individuals can make good decisions but be unable to implement them. Low self-control (hyperbolic discounting) is one factor that can prevent implementation. Clear examples are the difficulties that people have exercising, reducing alcohol or food consumption, or quitting smoking even when they have decided that they want to do so. Implementation issues in terms of health habits (actually quitting smoking) and use of the medical care (e.g. adherence to medication and other regimes) represent a gap that should increasingly be analyzed by economists. Who has problems with implementation? Why? What can be done about this? And what are the natural experiments that might be implemented under health reform that could be used to test such theories?

### **Cognition and Health**

As baby boomers age, they can expect the inevitable declines in cognitive and physical functioning, with an impact on their ability to work at advanced ages. What technologies might change the workplace? For example better technology could ease the cognitive demands of

"desk work" or create new approaches to making it possible to overcome the consequences of mild declines in certain cognitive abilities with age.

As they age, there is also a mismatch between the complexity of the decisions they face and the often gradual and sometimes sudden cognitive declines that accompany aging. It is already clear that cognitive resources are important in managing defined-contribution-type pensions, but also in navigating consumer-directed health care. Identifying how economic rationality changes over the life-course, with particular attention to declining cognitive function for older adults, and how market mechanisms endogenously develop to help and sometimes to exploit older adults with cognitive decline.

One of these challenges is to develop a more unified theoretical framework that integrates economic, psychological, genetic and neurological theories. The theory should help us understand how people's cognitive capacities develop over the lifecycle and how these capacities influence people's performance in the economy, the quality of their decisions about saving, health and retirement and their ability to manage their resources after retirement. The theory should also help policy makers recognize the implications of population heterogeneity in cognitive capacities for responses to policy. Important recent advances have been made in incorporating cognitive and measures and measures into the HRS, but it should be a priority to add similar measures to HRS-sister studies in Europe, Asia and Latin America to allow cross-country variations in policies and institutions to help understand the effects of policies on the welfare of older people.

### **Disability and Unemployment Insurance**

The economics of disability is an area that is relatively understudied and of major importance. Not much is understood about the dynamics of work and health around the time of disability onset, and even less is known about the degree to which employers either support people in their attempt to return to work. Nor do we know much about workers with poor educational attainment who stop working, but do not apply for SSDI.

A related issue involves the decisions prime aged men make as their health begins to limit their capacities. There has, of course, been work on the DI and SSI programs, but this has mostly ignored the range of options potentially open to people in these positions; do they try to find ways to accommodate their limitations? And why are those with less than a high school education most likely to also experience a limitation of health and a capacity for work? A focus on decisions made from the point of view of the (extended) family and with longitudinal perspective are both important. Similarly, we know little about people in their 40s, who are not covered by the HRS, nor about the context of households (for example, the availability of health insurance from a spouse) when individuals chose to apply for SSDI.

Another key question is what are the interactions among unemployment insurance (UI), SSDI, and OASI? On the one hand, by providing income replacement not accessible to younger workers, SSDI and OASI may prevent older workers from taking lower paying jobs. On the other hand, given the apparent difficulty of older unemployed workers in finding jobs, SSDI and OASI may function as residual safety-nets, permanently absorbing workers who need only short-term income support. In this case, other adjusting other labor market programs, such as UI or job search assistance, to the special needs of older workers may prevent permanent reductions in labor force participation of older unemployed workers at overall lower cost for these programs

combined. A closely related question is whether extensions in the duration in UI in recessions, as is commonly done in the U.S., also prevent some older workers from transiting to SSDI or OASI, and hence help to maintain their attachment to the labor force.

More generally, how do we reform social insurance to best encourage work among able elderly while protecting those who aren't able to work, particularly as early eligibility ages for Social Security rise? A richer understanding of how public policy impacts the broad well-being of the elderly is necessary, and not just their income or mortality.

### **Early Origins of Health over the Life-course**

The positive correlation between years of formal schooling completed and many different measures of good health is one of the key relationships in health economics, but the mechanisms of causality are much less well understood, and could shed further light on a number of issues.

Studies of disasters (e.g., famine, influenza) document the importance of health shocks at early ages (including in-utero) on later-life health and mortality. But what about prolonged exposure to more modest influences, including exposure to and severity of the full range of childhood diseases, unhealthy physical conditions (lead, air pollution, workplace hazards), socio-economic environments (poverty and social disorganization), and family misfortunes (job loss, loss of health insurance, entrepreneurial misadventures, parental death, illness, or marital disruptions)? It seem likely that various life experiences account for some of the observed variation in thrift and financial acuity, but the relative importance of various links is poorly understood. Similarly, what are the long-term effects of divorce and household dissolution on preparing for retirement?

### **Elderly Health, Time Use, Family Structure, and Social Ties**

The well being of older Americans depends on their health, their financial situation, and their ties to family and social networks. There is important work to be done in each area, and even more in understanding the linkages between them. For example, there has been a growth in three-generation families. In some families, longer-lived parents and less independent children lead to extended periods where three generations are living under one roof, or in close geographic proximity. What are the consequences of such living arrangements for the aging parents? For the children? For the health and economic well-being of the adult generation in between? Do children who grow up with failing or thriving grandparents who are co-resident or nearby have a different vision of old age than those with little contact with their grandparents? Do such differences translate into behaviors that affect their health behaviors, propensities to save, and well-being more generally?

Another topic is time use among the elderly: Existing work in the economics of aging focuses on time in two important ways – the retirement decision (time spent in employment vs. “leisure”) and mortality (capital T in the standard life-cycle model). We know much less about non-work uses of time among older Americans, how to encourage “time intensive” health behaviors, and how to encourage those who are healthy enough to volunteer to do so. How does this affect the elderly and what are the implications for their quality of life, health, and happiness are interesting and relatively unexplored topics.

### **Employment of the Elderly**

First consider the *supply* of elderly workers:

Can health improvements especially among less educated mature and older workers could help maintain or raise labor force attachment beyond the traditional retirement age? And where do these health limitations arise –are they work-related, predate adverse work-related health events, or exacerbated by a lack of health insurance?

Another related question is whether job loss, unemployment, or labor force withdrawal of older workers itself leads to adverse consequences for mental or physical health, or to the atrophy of human and social capital. This pattern, related to the phenomenon of ‘social exclusion’, has received mixed evidence in the existing literature. Yet, if true, it implies that even temporary exit from the labor force may make it difficult to reintegrate older workers into the labor force. It also implies that longer-term health costs of labor market outcomes may partly be borne by Medicare.

What prevents older workers from being reintegrated quickly into the labor force following unemployment? Do older workers have unrealistic expectations about the wages and working conditions they can expect to receive? Does skill-accumulation indeed declines rapidly with age? Is it due to limited horizons for additional training, or cognitive or health-related costs? And should the government heavily subsidize retraining for mature and older displaced workers (as it for example does through Trade Adjustment Assistance)?

Other reasons why they might not reenter the labor market is because of other income sources from savings or spouses, and lower consumption needs due to the absence of mortgage payments or expenses for children. One needs more information on expectations and consumption, and sufficient samples of unemployed older workers. Progress is available, such as a merge of OASDI information with employer data.

There is a lack of reliable models for analyzing the impact of public policies, business cycles, and institutions on incentives to retire, and on the eventual welfare of our population once they retire. Public agencies, such as the Social Security Administration and CBO, have crude, reduced form, often internally inconsistent models for analyzing retirement and saving behavior. What is required is to build on an existing foundation of structural models of retirement and saving to replace these outmoded approaches.

Another important component of retirement models is the relationship between health and work. There is mixed evidence on whether exogenous retirement improves or reduces (or has no impact) on health, but these studies may not get at causal relationships, given the greater likelihood of retirement following declining health. While the health effect of retirement is interesting in its own right, we need more research to draw policy conclusions about the health effects of retirement.

We next turn to the *demand* for labor by firms.

An important aspect to studying the role of firms in determining older workers’ employment – be it the incentive of firms to exploit the presence of OASDI, the importance of employment contracts, firms’ views of older workers, or outright age discrimination – is the availability of data of the employers of older workers. For example, despite the fact that a wide fraction of the labor force is covered by age-discrimination legislation, little conclusive evidence of the strength

of age-discrimination in the U.S. is available. It is possible to calculate the SSDI entry-rate or the rate of early OASI claiming by employer using administrative data from the Social Security Administration (SSA), however. Whether firms differ in the rate they employ older workers has been recently studied using data on the universe of workers and employers provided by the Census Bureau through the Longitudinal Employer and Household Dynamics (LEHD) data set.

As well, how employment outcomes, health status, and health insurance cost interact could be studied by merging administrative Medicare data on health care utilization with workers' earnings and employment histories, either through the Census Bureau or through the Social Security administration. The dynamic firm side data developed by John Abowd and his colleagues at Census could also be merged with the HRS.

A key aspect to the ultimate success of this growing data infrastructure is that the data remain accessible to the broad research community. The tremendous usefulness of large administrative data bases, be it alone or combined with survey data, is likely to help further increase its accessibility and use in academic research on the economics of aging.

### **Gene/Health and Biological Interactions**

There is a rapidly growing important literature that describes the relationships between neural and genetic factors, on one hand, and economic and social decision-making on the other. Many of the associations that have been the most influential describe interactions between genes and the environment that are associated with indicators of well-being. However, in many cases, the environment is a portmanteau measure of socio-economic status (education, for example); in other cases, environment is arguably related to other choices made by the individual (or, more generally, related to individual-specific unobserved heterogeneity in the model of interest). Identifying causal mechanisms, and linking these relationships to preferences, decisions and well-being will be an extremely rich line of scientific inquiry to better understand the process of aging potentially reaching back into the fetal period, early childhood and adolescence.

One promising line of research is between- and within-family effects and heterogeneity: Children and adults in some families may be permanently scarred by adverse events, with consequences for health, financial situation, or social ties in old age. "Similar" children and adults in other families may show no long-term effects. What accounts for these differences? Perhaps more perplexing is the fact that even siblings may experience very different long-term effects of bad (or good) things that happen to them as children and as adults.

There are great potential gains for the use of biological measures and scientific knowledge in economic analyses. Biologic measure could be used as better calibrated, objective outcomes, could address omitted variable problems, and could allow economics to study new areas of health. The use of fMRIs to directly examine how decisions are made and use of heart rate variability and cortisol to measure stress are two examples that could be used in policy studies. Genes could be used to examine heterogeneity across individuals in responses to policies.

### **Health Care Systems**

Among respondents, there was considerable interest in extending research efforts into many different aspects of the health care delivery system -- or the science of health care delivery, as it were. A reoccurring theme is the use of a randomized clinical trial (RCT) at the system

level to tease out the impact of supply-side reform on both quality and costs. This could provide a particularly effective way to study which types of health care systems have a real impact on “bending the cost curve.” Indeed, many of the media stories about the Oregon Medicaid expansion RCT talked about the need for other RCTs for important health policy issues.

A related suggestion was to integrate the best of broad-purpose population-representative longitudinal surveys with randomized treatment-control designs. By developing longitudinal studies that have a component that is, by design, set aside for large-scale randomized interventions, scientific infrastructure to test key causal relationships linking aging with economic choices and outcomes would be established.

Other topics include (in random order):

(a) Health insurance choice: given the greater likely role of insurance choice, whether because of Part D or future policy changes (such as the Ryan plan), how do elderly people make choices, and what are the pros and cons of alternative structures of insurance choice?

(b) What are the trajectories of older patients’ long term care experiences, including the evolution of the post-acute rehabilitation and nursing home sectors – all heavily for-profit -- as well as growth in hospice care?

(c) If financial incentives cause physicians to recommend more treatments or more expensive treatments, then does greater resource intensity result in better health outcomes? More importantly, what are the specific factors (and for which diseases) that appear associated with better outcomes?

(d) How does the type of medical treatment affect subsequent investments in health capital? For example, differences in surgical treatment for coronary artery disease (less invasive stents versus more invasive open-heart surgery) may affect the investment cost (in terms of things like pain while exercising) of improving cardiac health. More generally, post-treatment health investment decisions could have a large impact on long-term clinical outcomes; these effects would be expected to differ by education and other characteristics.

(e) We know little about the health related reasons beneficiaries switch between fee for service and Managed Care and whether switching patterns vary by type of plan, controlling for plan characteristics. Nor do we know about the impact of cutbacks in employer-provided “medigap” plans and the possible switch to Medicare Advantage plans.

(f) An understudied topic is health information technology (IT). Investments will be needed in health IT that will be uneconomic for small groups. These investments will be more critical to the degree that physicians (and institutional providers) are financially rewarded for better quality care, but this will be difficult for small scale practices to do so.

(g) How has the rise of the hospitalist in US hospitals affected the experience of older, frail patients?

(h) The nursing home population has declined, mostly because whites are using nursing homes mostly for short stays, while minorities are more likely to become permanent residents, resulting

in a large proportionate increase in minorities in US nursing homes. What factors influence the sorting process by which majority and minority Medicare beneficiaries find themselves using such different kinds of long term care services?

(i) A fundamental question is how do we explain and rationalize expenditures for health. At the micro level there are two reasons to spend on health – an investment motive (it prolongs longevity and decreases susceptibility to health shocks) and a consumption motive (health is undoubtedly something that contributes to satisfaction). It is important to measure accurately the impact that policies will have on each of these separate components.

(j) While access to Medicare and Medicaid data is no longer a problem, pricing is; each new grant applicant requesting use of the same data pays anew for the data resulting in considerable overpayment across NIA grantees. Furthermore, the National Center for Health Statistics has launched a new strategy for obtaining regular basic data on the population of Assisted Living Facilities, Adult Day Care Centers and home care providers. Investment in these and other data resources through inter-governmental arrangements or via making them accessible via secure web portals is a critical need if we are to pursue the important questions enumerated above.

(k) Finally, several researchers suggested a role for NIA in evaluating the impact of the Affordable Care Act on health and retirement among the near-elderly. Under this category, there were several different suggested approaches:

(i) A sea change is occurring in Medicare reimbursement of providers. How will bundled payments affect quality and costs? Which quality measures are the best indicators of beneficiary well-being in the short and the long run? Do providers respond differently to quality incentives in the context of fee-for-service reimbursement compared to capitated or gain-sharing reimbursement? And how will the silos of post-acute care and long term care, including the growing array of home and community services and assisted living facilities, respond to health care reform?

(ii) What will be the impact of moving away from small scale, independent physician practices to larger integrated health care systems in terms of clinical efficiencies or with regard to potential anti-competitive spillovers?

(iii) In 2014, the Affordable Care Act makes millions of low and middle-income adults eligible for Medicaid or for subsidized, community-rated private coverage through new state health insurance exchanges. How will these changes affect insurance coverage, retirement decisions, financial security, medical care, use, and health among new cohorts of the elderly? What spillover effects will there be for Medicare and Social Security?

(iv) What are the effects on health and premiums of cost-sharing increases, increasing the eligibility age, and reductions in payments to providers?

(v) Hospitals can most likely absorb “productivity adjustments” or cuts in reimbursement rates for a few years without much noticeable effect, but as time passes their cumulative impact will become increasingly problematic. The cuts among post-acute care providers will be larger than among hospitals, but we know little about how such cuts will affect quality and outcomes.

(vi) As pay for performance reward and penalty systems are introduced, are there negative consequences of using the “wrong” outcome measures for frail patient populations, since they are often most influenced by these types of policy changes?

### **Immigration and Older Americans**

Recent immigration to the US has potentially important effects on the population of older Americans over the next several decades. This depends on the extent of assimilation (in health-relevant behaviors as well as economic integration), the extent of return migration, and the correlation between the two (i.e., on the selectivity of return migration).

### **International Perspectives on Health and Aging**

International comparisons can be useful for answering a wide range of questions related to aging. For those of working age, there are important differences between as well as within countries in employment security, the length and continuity of vacation time, frequency and quality of contact with the health care system, and choice of home-to-work transportation modes. How do these affect precautionary saving, time use in retirement, timeliness of seeking treatment for age related illness, and re-optimization by those who must give up driving as they age?

Another important opportunity for international studies is in the area of health care. We still don't have a compelling decomposition of how much of the higher level of spending in the US versus other nations is due to more intensive use of the same procedures as elsewhere, or the use of different procedures, or the greater cost of these procedures. Nor do we have a good breakdown of growth in health care spending relative to GDP over the last three decades.

Similarly, international comparisons may prove to be a fruitful approach to understanding which cost control solutions work best for Medicare, and health spending in general. For example, the Netherlands has a health care system that looks a lot like a post-ACA U.S., yet at costs that are two-thirds as high. Why? In other words, we should move the focus away from Canada towards more realistic models.

For many years NIA has invested in and supported efforts to collect high quality longitudinal data on older members of society in many developed and developing countries. Collectively the data can yield benefits that are greater than the sum of the benefits from each individual study, suggesting that one should utilize the research opportunities created by the whole constellation of data rather than (or in addition to) its individual parts.

Stretching beyond OECD countries is likely to have an even bigger pay-off for both science and policy. The heterogeneity across Asia, Latin America and Africa has the potential to yield new knowledge about the complex interplay between individuals, families, communities and institutions. These data are important in and of themselves, but also because they will provide unparalleled opportunities to pin down key causal relationships that link the well-being of older adults to choices and their environment. This would require collecting neural, genetic and other biological markers with information about social and economic behaviors and outcomes.

## **Macroeconomics, Productivity, Aging, and Health**

Household differed in their pre-existing vulnerability to the recession. What are both the effects of the great recession on these factors (and on health more generally) and how will this and technological changes more generally affect the ability of older people to keep working?

There is a literature that argues that people's health changes (in particular, it worsens) during recessions. Authors point to the high level of stress or depression, or inactivity, associated with losing a job, or being unable to find one. Others find just the reverse, so these are not uncontroversial findings, but ones that should be resolved.

There is also strong evidence that the occurrence of disabilities, reports of disabilities, applications for disability insurance, and disability award rates all display a fair amount of counter-cyclicality, whether in the US or other countries such as Spain and Germany. One explanation (aside from the "biological" issue or economic factors – a shift in permanent earnings, for example) is that the perception of the existence of a disability may become more acute when people are out of work or spend less time at work. These factors, however, are not well understood, particularly with regard to what appears to be a movement towards pro-cyclicality in disability applications after the mid-1990s. One question worth asking is whether after 1996 the welfare reform may have induced changes in the behavior of people at the bottom end of the distribution of wages and create perverse interactions between, say, TANF/Food Stamps application and DI application?

What are the longer-term macroeconomic effects of an aging population? We have lots of research on micro issues, but what we have relatively little of is information on how factors like the rate of productivity growth and technical change are affected by an older population, or of how aggregate changes in population age structure may affect micro institutions, such as labor market institutions that in turn influence the ability of older workers to remain in the labor force. There is intriguing information on technical change across countries and the age structure of the population, as well as age-specific patterns of patenting and research generation, but not much else. Yet we all know that the long-run effects of changes in the rate of productivity growth swamp everything else in terms of standards of living and capacity to support entitlement programs.

Combining the micro and the macro aspects of aging is an exciting area of research. There are many good micro models of aging that focus on the impact of changing prices and policies on the aging process. There is work in macroeconomics that seeks to further our understanding of the impact of demographic change on prices. It would be fruitful to combine these lines of investigation to better understand the impact that prices have on the aging process and the impact that the aging process has on prices in an equilibrium model.

How at the level of society does an older population leads to adaptation? For example, how do Maine and New Hampshire (two of the oldest states) differ from Alaska and Utah (two of the youngest) in terms of the social and market infrastructure to serve an older population? Is it "easier to be old" in the former than the latter, in the sense that there are more services for older individuals, or that firms have adapted to some degree to accommodate older workers?

One final key issue is the productivity of NIH grantees by age, and the potential impact of age on the diminished relative productivity of US scientists over time. How much of the

slowdown in U.S. research productivity is due to the significant demographic changes in science -- including but not limited to the aging of the scientific workforce -- and how much is due to specific changes in the institutional and legal structures of science?

### **Pensions and Saving**

There is considerable controversy about how well workers are economically prepared for retirement. Some of the controversy stems from uncertainty about the level and variance of future out-of-pocket spending for health care. Such spending depends on future health, future public policy, and choices individuals and households will make. One research approach would be to identify new mechanisms to promote incremental savings for out of pocket health costs in retirement. As well, one may want to develop new mechanisms that facilitate defined contribution wealth de-accumulation during retirement, including mechanisms that address longevity risk.

Another issue is the unique characteristics of state and local pension plans. Perhaps 15% of US employment is with state and local governments. The state and local pension plans typically are very generous and provide large incentives to retire early. While in the private sector DB plans seem to be on the way out and replaced by 401(k)-like plans, this is not true to the same extent in the public sector. What are both the causes and consequences of these plans, and are they at risk from state-level budget cuts?

There are other issues regarding financial advising and assets as people age. For example, what is the regulatory environment for financial advisors to the elderly? And what can be done with housing equity among the elderly? Typically people arrive at retirement with most of their money invested in their house; if they do not wind up staying in their house for the rest of their lives because of nursing homes or assisted living, how does that affect the design of a reverse-mortgage-like product?

As the pension landscape has switched from defined-benefit to defined-contribution plans, workers' pension wealth depends on the cost of asset management as well as asset choices and contribution behavior of workers. We know that differences in management fees between plans can have large effects on the rate at which balances in these plans accumulate. But because DC plans do not encourage long-tenure employment, workers nearing retirement will often have retirement wealth that reflects participation in different plans with potentially different fee structures. The inequality of pension wealth may (or may not) be exaggerated if workers in poorly managed plans are likely to be in similar plans earlier or later in their careers.

### **Projecting Future Health and Spending Trends**

We know little about the long-term trends in health and in the costs of health care. What will be the trajectory of dementia prevalence rates, for example, and how will households and society manage the associated costs? What are the macroeconomic consequences of population aging -- will an older workforce diminish productivity growth (as noted above)? Nor do we know much about future labor force participation, a key factor in the solvency of Social Security.

Morbidity and mortality forecasts such as those used by the Social Security Administration perform badly over long periods of time because they do not account for differences in cohorts' prior life experiences. A growing body of work finds that insults from early life conditions, particularly during critical periods such as the womb, before age three, or

adolescence, lead to chronic disease and increased morbidity at older ages. What is therefore needed is an understanding of the micro-determinants of health and longevity for different cohorts. Such an understanding would not only improve the forecasts used for pension and health care programs but also would help us understand the role of health in economic development.

To understand future mortality patterns, we require better data. Such data should contain detailed information on different cohorts and the environment in which they live at different stages of the life cycle. (A cohort wired for a poor diet and then fed a rich diet is likely to have a very different experience from one consistently fed a rich diet.) In addition, because evidence is increasingly pointing to the intergenerational transmission of health through the mother, what is also needed is intergenerational data. A better understand (as noted above) of how early life conditions translate into later outcomes, perhaps triggered by environmental factors, would also be necessary. Finally, we need to project how major determinants of health are likely to change and what impact this will have on the economy as we move from where we, as a species, had little control over the disease environment to one in which we have more control.